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# SHELL FUSE

## Background of the Invention:

### Field of the Invention:

The invention concerns a shell fuse having a target acquisition sensor, in particular an impact sensor, and a firing train in which a firing device carrier is movable from a safe position into an armed position.

In prior art fuses for shells, in the safe position a primary firing means arranged in a firing device carrier, for example a rotor, is pivoted out of the firing train. It is only after launch of the shell and more specifically with a bore-safety factor that the primary firing means is pivoted into the firing train. The corresponding time is very short in comparison with the total flight time of the shell. The fuse is therefore in the armed position throughout almost the entire shell flight time. The firing train does not afford an overflight safety aspect.

Usually an overflight safety aspect is achieved in that an electronic system of the fuse, in dependence on its programming, charges up an electrical firing circuit only at a

certain moment in time shortly before the projectile reaches the target and thus renders the fuse ready for operation.

Summary of the Invention:

It is accordingly an object of the invention to provide a fuse configuration, which overcomes the above-mentioned disadvantages of the heretofore-known devices and methods of this general type and which provides for overflight safety as far to the target in a simple manner.

With the foregoing and other objects in view there is provided, in accordance with the invention, a shell fuse configuration, that is a fuse for a projectile. The novel device comprises:

a target acquisition sensor, such as, for example, an impact sensor;

a firing train including a firing device carrier movably disposed from a safe position into an armed position;

a force element disposed to be initiated by the target acquisition sensor and coupled to the firing device carrier for moving the firing device carrier into the armed position.

In accordance with an added feature of the invention, the force element is coupled to a firing pin of the firing train

such that the firing pin is blocked in the safe position and released in the armed position.

In accordance with an additional feature of the invention, a linearly movable pin is provided for coupling the force element to the firing device carrier. In a preferred embodiment, there is provided a safety pin coupling the force element to the firing pin, with the safety pin bearing against the linearly movable pin.

In accordance with another feature of the invention, an electronic system is connected to the sensor and the force element. Upon target acquisition, the sensor passes a signal to the electronic system, and the electronic system triggers the force element.

In accordance with a further feature of the invention, the force element is a pyrotechnic force element with a piston bearing against the linearly movable pin coupling the force element the firing device carrier.

In accordance with a preferred feature of the invention, the linearly movable pin is displaceably supported parallel to the firing pin and the safety pin is transversely displaceable with respect to the linearly movable pin.

In accordance with again an added feature of the invention, the linearly movable pin is formed with a recess for receiving the safety pin in the armed position.

In accordance with again another feature of the invention, the firing pin is formed with a bevel whereupon the safety pin is braced against in the safe position.

In accordance with a concomitant feature of the invention, the firing device carrier is a rotor formed with a radial nose, and the linearly movable pin is disposed to act upon the rotor via the nose.

In other words, the objects of the invention are achieved in that there is provided a force element which can be initiated by the response of the sensor and which is coupled to the firing device carrier in such a way that the firing device carrier is movable into the armed position. As a result, it is ensured that the firing train is only closed when the target has practically been reached. Therefore the bore safety factor is integrated with an overflight safety factor as far as the target. There is no need for specifically separate devices for ensuring bore safety and overflight safety respectively. The sensor initiates the armed position and firing substantially simultaneously, by way of the force element.

The force element is preferably coupled to a firing pin or striker of the firing train in such a way that the firing pin is blocked in the safe position and released in the armed position. This provides that the firing pin can become operative only when the firing device carrier is in the armed position.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a shell fuse, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

Brief Description of the Drawings:

Fig. 1 is a partly broken away, perspective view showing a mechanical firing system of a shell fuse in the safe position; and

Fig. 2 is a similar view showing the firing system in the armed position.

Description of the Preferred Embodiments:

Referring now to the figures of the drawing in detail a fuse of a shell has in a firing train with a firing pin or striker 1, a rotor 2 forming a firing device carrier that carries a primary firing means in the form of a piercing detonator 3, and a secondary firing means 4. The firing pin 1 is subjected to the force of a compression spring 5 and has a bevel 6.

The rotor 2 is provided with a radial nose 7 with which there is associated a linear pin 8, which is movable parallel to the firing pin 1. The pin 8 is formed with a recess 9 and is connected to a piston 10 of a pyrotechnic force element 11. The pin 8 and the piston 10 can be formed in one piece.

A target acquisition sensor 13 is connected to an electronic system 12 with which the force element can be initiated. The sensor 13 can be an impact sensor, a proximity sensor, or a spacing sensor.

A safety pin 14 is displaceable between the firing pin 1 and the pin 8, transversely with respect to the direction of movement thereof.

In the safe position illustrated in Fig. 1, the rotor 2 is pivoted in such a way that the piercing detonator 3 is outside the firing train. The firing pin 1 is blocked by virtue of the fact that the safety pin 14 which is supported by the pin 8 bears against the bevel 6 of the firing pin 1. That safe position is maintained during the flight of the shell as far as the target.

Upon target acquisition, in particular target impact in the case of an impact sensor, the sensor 13 responds. As a result the force element 11 is fired by way of the electronic system 12, whereby its piston 10 displaces the pin 8. The pin 8 strikes against the nose 7 which causes the rotor 2 to pivot into the armed position illustrated in Fig. 2. The electronic system 12 has still further functions to perform; for example it can produce a time delay such that firing only takes place when the shell has penetrated into the target.

When the pin 8 has pivoted the rotor 2 its recess 9 is at the safety pin 14 (see Fig. 2) so that the latter is displaced by the compression spring 5 by means of the bevel 6 and releases

the firing pin 1. The latter now strikes under the force of the compression spring 5 against the piercing detonator 3 whereby firing is effected or initiated.